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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,147	01/25/2007	Tomoyasu Sunaga	17155/005001	6796
22511 7590 03/17/2011 OSHA LIANG L.L.P. TWO HOUSTON CENTER 909 FANNIN, SUITE 3500 HOUSTON, TX 77010				
EXAMINER				
BOHATY, ANDREW K				
ART UNIT		PAPER NUMBER		
1786				
NOTIFICATION DATE		DELIVERY MODE		
03/17/2011		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary****Application No.**

10/589,147

**Applicant(s)**

SUNAGA ET AL.

**Examiner**

Andrew K. Bohaty

**Art Unit**

1786

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 January 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1.5, 10 and 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1.5, 10 and 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-040)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 21, 2011 has been entered.
2. This Office action is in response to the amendment filed January 21, 2011, which amends claims 1, 5, 10, and 12, and cancels claims 2, 3, 6, 7, 9, 11, and 13-16. Claims 1, 5, 10, and 12 are pending.

***Response to Amendment***

3. Applicant's amendment of the claims, filed January 21, 2011, has caused the withdrawal of the objections of claims 10 and 12 as set forth in the Office action mailed July 22, 2010.
4. Applicant's cancellation of the claims, filed January 21, 2011, has caused the withdrawal of the rejection of claims 2, 3, 6, 7, 9 and 11 under 35 U.S.C. 103(a) as being unpatentable over Aurelie et al. (WO03/048225) in view of Son et al. (US 2003/0094595) and applicants' admitted prior art as set forth in the Office action mailed July 22, 2010.

5. Applicant's cancellation of the claims, filed January 21, 2011, has caused the withdrawal of the rejection of claims 2, 3, 6, 7, 9 and 11 under 35 U.S.C. 103(a) as being unpatentable over Miteva et al. (Adv. Mater. 2001, 13, 565-570) in view of Aurelie et al. (WO03/048225), Son et al. (US 2003/0094595), and applicants' admitted prior art as set forth in the Office action mailed July 22, 2010.

### ***Response to Arguments***

6. Applicant's arguments filed January 21, 2011 have been fully considered but they are not persuasive.

7. In response to the applicant's arguments that the claimed invention has shown unexpected results, when one looks at Tables 1, 2, and 3 in the applicant's specification, it is clearly seen that when each type of impurity is at its lowest amount the maximum current efficiency is at the highest value. This corresponds to sample 1 in Table 1, sample 7 in Table 2, and sample 13 in Table 3. These results show that compounds that have the lowest amount of impurities have the greatest current efficiency. This agrees with the position of the examiner and is not unexpected.

8. Furthermore, when looking at samples 1-3 in Table 1, one cannot determine if it is the total amount of impurities present causing the decrease in current efficiency or if it is due to the amount of metal ions being less than the amount of Cl ions. In samples 1-3 not only does the amount of each ion changes but the total amount of ions present changes; therefore, one cannot conclude what is causing the change in maximum

current efficiency. Therefore, one cannot determine what is causing the applicant's results.

9. When comparing samples 4 and 6 in Table 1, the difference in current efficiency is very small and the sample where the total amount of metal ions is greater than chloride ions actually has a greater current efficiency; therefore, having the total amount of metal ions be greater than the total amount of chloride ions might not be the cause in the increased current efficiency. When looking at Table 1, it appears that the samples with the lowest amount of impurities has the highest current efficiency and it is hard to tell what rolls the amount of total metal ions to chlorides ions has on the current efficiency in data presented by the applicant. Therefore, the applicant's arguments the at invention shows unexpected results is not persuasive because one cannot tell from the data presented what is causing the improved performance.

10. Also, 2144.04 section VII of the MPEP states "Pure materials are novel vis- à-vis less pure or impure materials because there is a difference between pure and impure materials. Therefore, the issue is whether claims to a pure material are unobvious over the prior art. In re Bergstrom, 427 F.2d 1394, 166 USPQ 256 (CCPA 1970). Purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious. Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989)." Since the applicant's have not provided evidence that can clearly show that there claimed invention shows unexpected results, since the claimed polymers are known in the art and are purer forms of the known polymers, the claims are not unobvious over the prior art and are not patentable

***Specification***

11. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

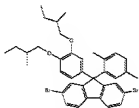
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aurelie et al. (WO03/048225), where Treacher et al. (US 2004/0260090) (hereafter "Treacher") is used as the English equivalent, in view of Son et al. (US 2003/0094595) (hereafter "Son") and applicants' admitted prior art (hereafter "AAPA").

15. Regarding claims 1 and 5, Treacher teaches polymers comprising the following



monomer unit, , and teaches the polymer is used as a light emitting material in an electroluminescent device (Table 1, paragraphs [0108] and [0135]).

Treacher further teaches that the amount of impurities, including inorganic substances, including metals such as Pd, found in the polymers should be as possible and the impurities can be removed by a variety of different means (paragraph [0090]). Treacher teaches that impurities, such as Pd, cause impairments in the light emitting device and the impurities should be removed (paragraph [0068]).

16. Treacher does not specifically teach the amount of the impurities in the polymer and is silent in the presence of Cl.

17. Son teaches fluorene containing polymers that can be used in the light emitting layer of a light emitting device (Fig. 1 and 2 and paragraphs [0080] and [0081]). Son further teaches the polymer contains impurities and the impurities need to be removed from the polymer (indicating the polymer should contain as little as the impurities as possible) (paragraph [0009]). Son teaches that removing the impurities improves the performance of the light emitting device (paragraph [0009]). Son is silent on the types of impurities.

18. AAPA teaches that polyfluorenes contain impurities and these impurities includes inorganic impurities such as metal elements including sodium, nickel, and palladium and other inorganic impurities such as chlorine (page 2 second to last paragraph of the

specification). AAPA further teaches that these impurities reduce the performance properties of the light emitting device they are used in (page 2 last paragraph of the specification).

19. Given the teaching of Treacher, Higashi, and AAPA, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the impurities from the fluorene containing polymers, to where the sum of the metals is less than the amount of chlorine. It would be obvious to reduce the amount of chlorine to be 50 ppm or lower. The motivation would have been to increase the performance properties of the light emitting device.

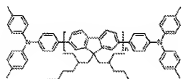
20. Furthermore, Treacher, Son, and AAPA teach that metal impurities, such as Pd, and halogens, such as Cl, are not good for organic light emitting materials when found in these materials as materials and the amount of these materials should be reduced as much as possible. It is well know that both the metal and Cl components are bad and there is legal precedent, that purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious, *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). Since the applicants do not provide any secondary evidence of unexpected results for the purified polymer and claim a purer form of a known product, the claims are not unobvious over the prior art and are not patentable.

21. Claims 1, 5, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miteva et al. (Adv. Mater. 2001, 13, 565-570) (hereafter "Miteva") in



view Aurelie et al. (WO03/048225), where Treacher et al. (US 2004/0260090) (hereafter "Treacher") is used as the English equivalent, Son et al. (US 2003/0094595) (hereafter "Son") and applicants' admitted prior art (hereafter "AAPA").

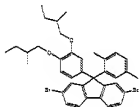
22. Regarding claims 1, 5, 10 and, 12, Miteva teaches an electroluminescent device comprising an anode, a cathode, and a light emitting layer composed of a fluorene polymer containing end-caps (page 567 left column last paragraph, right column first paragraph and page 569 right column 4<sup>th</sup> paragraph). The polymer has the following



structure, , (page 566, Fig. 1, Table 1).

23. Miteva does not teach the purification of the fluorene polymers.

24. Treacher teaches polymers comprising the following monomer unit,



, and teaches the polymer is used as a light emitting material in an electroluminescent device (Table 1, paragraphs [0108] and [0135]). Treacher further teaches that the amount of impurities, including inorganic substances, including metals such as Pd, found in the polymers should be as possible and the impurities can be removed by a variety of different means (paragraph [0090]). Treacher teaches that impurities, such as Pd, cause impairments in the light emitting device and the impurities should be removed (paragraph [0068]).

25. Son teaches fluorene containing polymers that can be used in the light emitting layer of a light emitting device (Fig. 1 and 2 and paragraphs [0080] and [0081]). Son further teaches the polymer contains impurities and the impurities need to be removed from the polymer (indicating the polymer should contain as little as the impurities as possible) (paragraph [0009]). Son teaches that removing the impurities improves the performance of the light emitting device (paragraph [0009]). Son is silent on the types of impurities.

26. AAPA teaches that polyfluorenes contain impurities and these impurities includes inorganic impurities such as metal elements including sodium, nickel, and palladium and other inorganic impurities such as chlorine (page 2 second to last paragraph of the specification). AAPA further teaches that these impurities reduce the performance properties of the light emitting device they are used in (page 2 last paragraph of the specification).

27. Given the teaching of Treacher, Higashi, and AAPA, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the impurities from the fluorene containing polymers of Miteva, to where the sum of the metals is less than the amount of chlorine. It would be obvious to reduce the amount of chlorine to be 50 ppm or lower. The motivation would have been to increase the performance properties of the light emitting device.

28. Furthermore, Treacher, Son, and AAPA teach that metal impurities, such as Pd, and halogens, such as Cl, are not good for organic light emitting materials when found in these materials as materials and the amount of these materials should be reduced as

much as possible. It is well known that both the metal and Cl components are bad and there is legal precedent, that purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious, *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). Since the applicants do not provide any secondary evidence of unexpected results for the purified polymer and claim a purer form of a known product, the claims are not unobvious over the prior art and are not patentable.

### ***Conclusion***

29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.
30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

31. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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